CLAIMS

1. A device comprising polymeric filaments, wherein at least one of the filaments includes at least one groove for slidably retaining at least one other filament, such that the device is adapted to revert to a tubular lattice structure when allowed to expand from a collapsed state.

2. The device of claim 1, wherein the tubular lattice structure has an expanded transverse diameter substantially identical to a manufactured transverse diameter.

3. The device of claim 1, wherein the manufactured transverse diameter is about 2 mm to about 300 mm.

4. The device of claim 1, wherein the manufactured transverse diameter is heat set at a temperature equal to or above a glass transition temperature of the filaments.

5. The device of claim 4, wherein the temperature is from about 100°C to about 200°C.

6. The device of claim 1, wherein the filaments have a diameter from about 10 micron to about 1000 micron.

7. The device of claim 1, wherein at least three of the polymeric filaments are braided at a braiding angle of about 5 ° to about 85 °.

8. The device of claim 7, wherein the braiding angle is from 40 ° to 50 °.

9. The device of claim 1, wherein the at least one groove has a combination of a depth and a height suitable to inhibit a movement of adjacent filaments in a transverse direction beyond the manufactured transverse diameter without inhibiting the movement in a longitudinal direction.

10. The device of claim 1, wherein the at least one of said filaments further comprises a plurality of grooves.

11. The device of claim 1, wherein the polymeric filaments comprise a thermoplastic polymer, wherein the polymer is selected from a group consisting of poly(ester), poly(lactic acid), poly(glycolic acid), poly(lactide-co-glycolide), poly(caprolactone), mixtures and copolymers thereof.

12. The device of claim 1, wherein the polymeric filaments are at least one of monofilaments or multifilaments.

13. The device of claim 12, wherein the polymeric filaments further comprise at least one of a biomaterial and an agent having a reactive group, wherein the reactive group is adapted to covalently react with a biomaterial.

14. The device of claim 13, wherein the reactive group is a member selected from the group consisting of an amino group, a thiol-reactive group, a carboxy group, a thiol group, a protected thiol group, an acyl hydrazine group, an epoxy group, an aldehyde group, and a hydroxy group.

15. The device of claim 14, wherein the thiol-reactive group is a member selected from the group consisting of a 2-pyridyldithio group, a 3-carboxy-4-nitrophenyldithio group, a maleimide group, an iodoacetamide group, and a vinylsulfonyl.

16. The device of claim 13, wherein at least one of the agent and the biomaterial is a member selected from the group consisting of an antibody, a viral vector, a growth factor, a bioactive polypeptide, a polynucleotide coding for the bioactive polypeptide, a cell regulatory small molecule, a peptide, a protein, an oligonucleotide, a gene therapy agent, a gene transfection vector, a receptor, a cell, a drug, a drug delivering agent, nitric oxide, an antimicrobial agent, an antibiotic, antimitotic, an antisecretory agent, an anti-cancer chemotherapeutic agent, dexamethasone, an extracellular matrix, free radical scavenger, iron chelator, an antioxidant, an imaging agent, and a radiotherapeutic agent.

17. The device of claim 16, wherein at least one of the agent and the biomaterial is at least one of an anti-knob antibody, an adenovirus, a D1 domain of the Coxsackie-adenovirus receptor, insulin, an angiogenic peptide, and an antiangiogenic peptide.

18. The device of claim 13, wherein the agent is covalently attached to the at least one of the filaments.

19. The device of claim 18, wherein the agent is a water-soluble photo-activatable polymer comprising:

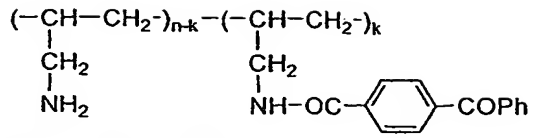
(a) a photo-activatable group, wherein the photo-activatable group is adapted to be activated by an irradiation source and to form a covalent bond between the water-soluble photo-activatable polymer and a surface having at least one carbon;

(b) a reactive group, wherein the reactive group is adapted to covalently react with the biomaterial;

(c) a hydrophilic group, wherein the hydrophilic group is present in an amount sufficient to make the water-soluble photo-activatable polymer soluble in water; and

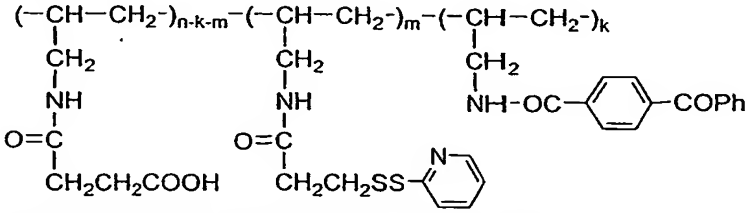
(d) a polymer precursor.

20. The device of claim 19, wherein the water-soluble photo-activatable polymer is represented by a formula:



wherein n is 50 to 2000 and k is 10 to 1000.

21. The device of claim 19, wherein the water-soluble photo-activatable polymer is represented by a formula:



wherein n is 50 to 2000, k is 10 to 1000, and m is 10 to 1 000.

22. The device of claim 13, further comprising a fiber in communication with the at least one of the filaments and, wherein the fiber is also in communication with the agent and/or the biomaterial, and wherein the fiber has a diameter of about 5 nm to about 10 microns.

23. The device of claim 22, wherein the agent and/or the biomaterial is applied to the fiber by coating, painting, stamping, printing, and/or spraying.

24. The device of claim 22, wherein the agent and/or the biomaterial is covalently attached to the fiber.

25. The device of claim 24, wherein the agent comprises water-soluble photo-activatable polymer and the biomaterial comprises an anti-knob antibody, an adenovirus, a D1 domain of the Coxsackie-adenovirus receptor, insulin, an angiogenic peptide, or an antiangiogenic peptide.

26. The device of claim 22, wherein the fiber consists essentially of the agent and/or the biomaterial.

27. The device of claim 1, wherein the tubular lattice structure is a stent.

28. A device comprising polymeric filaments, wherein at least one of said filaments includes at least one groove for slidably retaining at least one other filament, such that said device is adapted to expand from a collapsed state to form a tubular lattice structure having an expanded transverse diameter substantially identical to a manufactured transverse diameter.

29. A process of manufacturing the device of claim 1, the process comprising:

providing polymeric filaments;

arranging the polymeric filaments over a mandrel to form a tubular lattice assembly having interlacing junctions, wherein the mandrel has the manufactured transverse diameter;

heating the tubular lattice assembly at a temperature at least 10° above a glass transition temperature of the polymeric filaments; and

indenting at least one of the polymeric filaments at one or more of the interlacing junctions to make the at least one groove on the at least one of the polymeric filaments for slidably retaining the at least one other polymeric filament and thereby forming the tubular lattice structure.

30. The process of claim 29, further comprising contacting the at least one of the filaments with an agent having a reactive group, wherein the reactive group is adapted to covalently react with a biomaterial.

31. The process of claim 30, further comprising covalently attaching the agent to the at least one of the filaments.

32. The process of claim 30, further comprising contacting the at least one of the filaments with a fiber associated with the agent.

33. The process of claim 32, wherein the fiber has a diameter of about 5 nm to about 10 microns.

34. The process of claim 32, wherein contacting is done by at least one of an ultrasonic welding or an electrospinning process.

35. The process of claim 32, further comprising covalently attaching the agent to the at least one of the filaments.

36. The process of claim 29, wherein the temperature is from about 100°C to about 200°C and the heating is conducted for at least 30 minutes.

37. The process of claim 36, wherein the temperature is from 100°C to 150°C.

38. The process of claim 30, wherein affecting the interlacing junctions is done by a press.

39. A stent delivery system, comprising:

a delivery vessel;

the device of claim 1 as a stent, wherein the stent is placed in the delivery vessel in the collapsed state; and

a delivery unit capable of delivering the stent from the delivery vessel into a body lumen, wherein the stent is allowed to expand from the collapsed state to an expanded state such that an expanded transverse diameter of the stent is substantially identical to a manufactured transverse diameter of the stent and thereby a manufactured shape of the stent is retained.

40. The stent delivery system of claim 39, wherein the collapsed state is achieved by

stretching the stent in a longitudinal direction.

41. A process of manufacturing of the stent delivery system of claim 39, the process comprising:

providing the stent;

providing the delivery vessel;

providing the delivery unit; and

installing the stent into the delivery vessel and thereby forming the stent delivery system..

42. A process for delivery of a stent to a body lumen, the process comprising:

providing the stent delivery system of claim 39;

providing the body lumen;

contacting the delivery vessel with the body lumen; and

deploying the stent, wherein the stent is allowed to expand from the collapsed state to the expanded state such that the expanded transverse diameter of the stent is substantially identical to the manufactured transverse diameter of the stent and thereby the manufactured shape of the stent is retained and thereby delivering the stent.

43. A method for delivery of a biomaterial to a cell, the method comprising:

providing the device of claim 1 having a monomolecular layer of a water soluble photo-activatable polymer covalently attached to the at least one of the filaments;

providing a biomaterial having a plurality of active groups, wherein the biomaterial is covalently attached to the monomolecular layer; and

administering the device to the cell and thereby delivering the biomaterial.

44. The method of claim 43, wherein the biomaterial is a member selected from the group consisting of an antibody, a viral vector, a growth factor, a bioactive polypeptide, a polynucleotide coding for the bioactive polypeptide, a cell regulatory small molecule, a peptide, a protein, an oligonucleotide, a gene therapy agent, a gene transfection vector, a receptor, a cell, a drug, a drug delivering agent, nitric oxide, an antimicrobial agent, an antibiotic, an antimitotic, dimethyl sulfoxide, an antisecretory agent, an anti-cancer chemotherapeutic agent, steroidal and non-steroidal anti-inflammatories, hormones, an extracellular matrix, a free radical scavenger, an iron chelator, an antioxidant, an imaging agent, and a radiotherapeutic agent.

45. The method of claim 44, wherein the biomaterial is a member selected from the group consisting of an anti-knob antibody, an adenovirus, a D1 domain of the Coxsackie-adenovirus receptor, insulin, an angiogenic peptide, an antiangiogenic peptide, avidin, biotin,

IgG, protein A, transferrin, and a receptor for transferrin.

46. A method for delivery of a biomaterial to a cell, the method comprising:

providing the device of claim 1 having the biomaterial in communication with the at least one of the filaments; and

administering the device to the cell and thereby delivering the biomaterial.

47. The method of claim 46, wherein the biomaterial is covalently attached to the filament by the water-soluble photo-activatable polymer.

48. The method of claim 46, wherein the biomaterial is a member selected from the group consisting of an antibody, a viral vector, a growth factor, a bioactive polypeptide, a polynucleotide coding for the bioactive polypeptide, a cell regulatory small molecule, a peptide, a protein, an oligonucleotide, a gene therapy agent, a gene transfection vector, a receptor, a cell, a drug, a drug delivering agent, nitric oxide, an antimicrobial agent, an antibiotic, an antimitotic, dimethyl sulfoxide, an antisecretory agent, an anti-cancer chemotherapeutic agent, steroidal and non-steroidal anti-inflammatories, hormones, an extracellular matrix, a free radical scavenger, an iron chelator, an antioxidant, an imaging agent, and a radiotherapeutic agent.